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MANAGEMENT OF SOLID HOUSEHOLD WASTE IN UKRAINE IN 2018

Annotation

The paper analyzes the key aspects of solid household waste management in the territory of Ukraine in 2018. It has been explored that the main method of municipal solid waste disposal in Ukraine is landfill disposal (94,23 % of all municipal solid waste). As a result of this treatment, more than 1,38 billion tonnes of municipal solid waste has been accumulated in previous years. Moreover, most landfills do not meet environmental safety requirements. Only 46 landfills out of 6107 in Ukraine have a filtrate collection system and only 33 have the technological capacity to dispose of the filtrate. Only 18 landfills have biogas collection systems, where biogas is burnt in a torch or used to power cogeneration plants.

There is only one incineration plant in Ukraine, which disposes of only 2 % of waste generated. Since there is no efficient gas treatment system at the plant, it can only remove dust and ash particles with the help of electrostatic precipitators, and all other pollutants are released into the environment without neutralization. The implementation of separate collection systems for solid waste is very slow. Officially, such systems are implemented in 4,2 % of Ukrainian settlements today. Many of them operate in small territories or do not work at all. Organic waste composting systems are not used at all. In 2018, less than 0,03 % of municipal solid waste was composted. All these facts indicate that the government does not have a single strategy in the field of solid waste management, and it does not pay the necessary attention to such extremely acute environmental problems.

Keywords: *household solid waste; garbage; separate collection; sorting; landfilling; incineration; recycling*

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СТАН ПОВОДЖЕННЯ З ТВЕРДИМИ ПОБУТОВИМИ ВІДХОДАМИ НА ТЕРИТОРІЇ УКРАЇНИ У 2018 РОЦІ

Анотація

У статті проаналізовано основні аспекти поводження з твердими побутовими відходами на території України у 2018 р. Встановлено, що основним методом знешкодження твердих побутових відходів в Україні є захоронення на сміттєзвалищах (94,23 % усіх твердих побутових відходів). В результаті такого способу поводження за попередні роки було накопичено понад 1,38 млрд. т твердих побутових відходів. Більше того, більшість сміттєзвалищ не відповідають вимогам екологічної безпеки. Лише 46 сміттєзвалищ з 6107 в Україні мають систему збору фільтратів, і лише 33 мають технологічні можливості для знешкодження фільтрату. Тільки 18 сміттєзвалищ мають системи збору біогазу, який вони спалюють у факелі або використовують для живлення когенераційних установок.

В Україні є лише одне сміттєспалювальне підприємство, яке утилізує лише 2 % утворених відходів. Оскільки на цьому підприємстві немає ефективної системи очищення викидів газу, вона може видаляти лише частинки пилу та золи за допомогою електрофільтрів, усі інші забруднювачі викидаються у навколишнє середовище без нейтралізації. Впровадження систем роздільного збору твердих побутових відходів має дуже низьку швидкість. Офіційно сьогодні такі системи впроваджені у 4,2 % населених пунктів України, багато з яких працюють на невеликих територіях або взагалі не працюють. Системи компостування органічних відходів взагалі не використовуються. У 2018 році було компостовано менше 0,03 % твердих побутових відходів. Усі ці факти свідчать про те, що сьогодні держава не має єдиної стратегії у сфері поводження з твердими побутовими відходами та необхідної уваги до таких надзвичайно гострих екологічних проблем.

Ключові слова: *тверді побутові відходи; сміття; роздільний збір; сортування; захоронення; спалювання; утилізація*

1. Formulation of the problem.

Each year, the country development level increases, due to the intensive growth of household solid waste (HSW) annually generated in Ukraine. At the beginning of the 21st century, the attention of the average citizen of Ukraine toward the HSW was limited to dumping it in a garbage can or container. The technologies and processes for their safe disposal or storage are insufficient and the pace of implementation is negligible. Today, almost every country in the world, regardless of the level of its development, has faced the problems of HSW [1, 2, p. 528, 3]. Ukraine is no exception.

For poor countries and countries with economies in transition, where most HSWs are disposed of or incinerated, environmental and sanitary-hygienic problems are more acute [4, p. 349]. They include the pollution of atmospheric air, surface and groundwater, soil of adjacent territories with toxic substances, intensive development of different species of birds, rats, fleas, pathogenic microflora for which the landfill became habitat. Today there is no single approach to solving HSW problems. According to the analysis of HSW management in some European countries, the results are extremely diverse [5]. For the EU Member States, the average share of landfilled, incinerated or reused waste is 25 % to 48 %. Sweden and Germany dispose of less than 1 % of waste collected. The rest are burned to produce energy, reused or composted.

The purpose of this study is to determine the condition of HSW management in the territory of Ukraine in 2018 and to explore the most appropriate way to tackle existing challenges in this field.

2. Statement of the main research material

Data from the Ministry of Regional Development, Construction and Housing and Communal Services of Ukraine indicate that 78 % of the country's population was covered by HSW removal services in 2018 [6]. However, in Volyn, Cherkasy and Odesa regions, this figure was only 61 % and 63 % respectively. By studying the problem more deeply, one will discover that the situation at the district level is even worse. Thus, in the Polissya and Stavishchanskyy districts of Kyiv oblast, only 10 % of the population is covered by HSW removal services [7, p. 10]. All in all, the following statistical information will cover 78 % of the Ukrainian population. During 2018, 54 million m^3/9,1 million tons of HSW were collected in Ukraine. The vast majority of waste (94,23 %) is landfilled at 6,1 thousand landfills with a total area of over 9,1 thousand hectares. Based on the data from the experts of the National Clean City Project on the concentrated morphological composition of waste [8], Ukraine loses 808 thousand tons of paper and cardboard, 1116 thousand tons of polymers, 1134 thousand tonnes of glass, 82 thousand tonnes of ferrous and 27 thousand tonnes of non-ferrous metals, 236 thousand tonnes of textiles, 82 thousand tonnes of wood, 2614 thousand tonnes of organic waste each year.

In 2018, 2,02 % (1,09 million m^3/208 thousand tons) of HSW was burned in Ukraine. The combustion was carried out at one incinerator plant, and three incinerator installations. Kyiv incinerator plant "Energya", one of four enterprises of this type, was built on the territory of Ukraine in the late '80s. At a capacity of 240,000 tonnes per year, the plant burns 20-30 % of HSW generated in Kyiv but the price of this process is too big. The entire gas cleaning system is limited to filters to remove only dust and ash particles.

In 2018, 5,77 % of the total amount of HSW was disposed of by different methods. 13216 m^3/1640 tonnes of organic waste were processed at the composting sites, which is less than 0,03 % of the total amount of HSW collected [6].

In addition, 1,51 % (813 thousand m^3/260 thousand tons) of the HSW collected in the territory of Ukraine in 2018 was sent to 25 waste-disposal enterprises located in different regions. By taking into account the gross collection of HSW, one can assume that this method is quite progressive for Ukraine. When it is possible to remove up to 80 % of reusable substances and materials from the total HSW stream by using the separate collection, then in the case of gross collection and subsequent sorting, this figure is usually reduced to 5-20 %. The selected raw materials quite often require additional processing.

In 2018, a separate HSW collection was introduced in 1181 settlements of Ukraine. It should be noted that this number increased by 359 settlements since 2017. Although this figure is only 4,2 % of the total number of settlements in Ukraine, it seems that priorities in the treatment of HSW in the territory of our country are beginning to emerge. As a result of the separate collection of HSW in 2018, almost 1,2 million m^3/146 thousand tonnes of various materials were delivered to secondary raw materials. They are mainly selected for further processing and reuse of paper, cardboard, glass, ferrous and non-ferrous metals, PET bottles, polyethylene, organic waste, rarely batteries, Tetra-Pak packaging, textiles, rubber. In fact, Ukraine does not have enough experience in sorting HSW yet. However, it would be premature to claim that HSW sorting is absent at all [4].

Despite all the difficulties of establishing separate collection of HSW, there is no alternative to it. In combination with other methods (incineration, disposal, etc.) it is possible to effectively tackle existing challenges.

The bulk of HSW in Ukraine is being disposed of today. Despite the enormous loss of natural resources, Ukraine continues to clutter its territory. According to official statistics [6], there are 6107 landfills in Ukraine now covering an area of 9172 hectares. These figures should be treated very carefully because a more detailed study of the above data raises a number of questions.

3. Conclusions

There is a catastrophic situation with the disposal of household solid waste in Ukraine. Huge volumes of accumulated HSW pollute the atmosphere, surface and groundwater, the soils of the surrounding areas, and have a negative impact on the environment. The country's leadership lacks a strategy for HSW management. None of the current trends in Ukraine (landfill, incineration, separate collection) receive due attention from the state. It should be noted that there have been some instances of the implementation of progressive methods of HSW management in sufficiently restricted areas but there is no systematic approach in this area. Despite the severity of the problems, $ 15,4 thousand/hectare was spent on landfill reconstruction from the state and local budgets in 2018. It seems catastrophically insufficient for such hazardous sites. In some areas, such funds were not allocated at all. It is also evident that Ukraine is not ready for the mass implementation of sophisticated incinerators with efficient and expensive gas purification systems. The same applies to waste processing plants, which are massively expensive and have a long payback period. Separate collection in conjunction with the reconstruction and rehabilitation of existing landfills is the most realistic and rapid way to solve existing problems.

References

1. Municipal Solid Waste in the United States - Statistics & Facts. From: https://www.statista.com/topics/2707/municipal-solid-waste-in-the-united-states.

2. Daskal S., Ayalon O., Shechter M. (2018). The state of municipal solid waste management in Israel. Waste Manag. Res. Jun. 36 (6): p. 527-534. doi: 10.1177/0734242X18770248.
3. Ahsan A., Alamgir M., El-Sergany M.M., Shams S., Rowshon M. K. and Nik Daud N. N. (2014). Assessment of Municipal Solid Waste Management System in a Developing Country. Chinese Journal of Engineering. From: http://dx.doi.org/10.1155/2014/561935.
4. Radovenchyk V.M., Gomelya M.D. (2010). Tverdi vidhody: zbir, pererobka, skladuvannia [Solid Waste: Collect and Recycle], Kondor, Kyiv, Ukraine. 2011. – 465 p.
5. Municipal Waste Treatment. (2016). From: http://www.cewep.eu/2018/07/05/municipal-waste-treatment-2016.
6. State of Waste Management in Ukraine in 2017. Retrieved from: http://www.minregion.gov.ua/napryamki-diyalnosti/zhkh/terretory/stan-sferi-povodzhennya-z-pobutovimi-vidhodami-v-ukrayini-za-2017-rik.
7. The concept of the introduction of a modern system of household waste management in the Kyiv region in 2017-2022. – KODA, 2017. – 43 p.
8. National project "Clean City" as a way to solve the problem of solid household waste management in Ukraine - From: http://www.clean.citi.com.ua.

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